

The Surgical Management of an Aneurysm of a Primitive Persistent Sciatic Artery

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WITH THE PRESENT widespread use of peripheral arteriography, anomalous arteries are sometimes noted as incidental findings of minor pathological significance. These anomalous vessels probably represent persistent primitive vessels that normally disappear during embryologic development. Disease processes that occur in such arteries lead to errors in diagnosis and difficulties in management. A patient with complications that developed secondary to aneurysm formation in a persistent primitive sciatic artery is reported in this paper.

Case Report

E. S. This 63-year-old married woman was admitted to the peripheral vascular service center of the Harlem Hospital on February 18, 1966 with pain in the left foot and gangrene of the toes. She had had periodic episodes of pain in this foot for the past six years. On several occasions she consulted her local physician who attributed these symptoms to poor circulation and prescribed pills. She had no pain suggestive of calf claudication but her left foot became colder quicker than the right foot. Four weeks prior to admission the pain had increased in the left great toe with subsequent development of skin discoloration of that area and the distal phalanges. Local treatment had been of no avail. There was no prior history of local or thermal trauma to the foot. She was a chronic smoker who smoked one package of cigarettes daily. A hysterectomy had been performed for fibroids 20 years previously.

On physical examination she was moderately obese and normotensive. Cardiac and chest examinations were normal. There was a well healed lower abdominal scar. No murmurs were heard

over the abdomen. The right femoral and popliteal pulses were normal. There was edema and swelling of the left foot and calf. The left great toe was gangrenous with a black eschar extending to the metatarso-phalangeal joint. Patchy areas of gangrene were present over the distal phalanges of the second, fourth and fifth toes. The left femoral pulse was equal to the right. The left popliteal and pedal pulses were not palpable. Oscillometric studies with the patient lying supine showed minimal to no deflections distal to the knee. Subsequent laboratory studies excluded diabetes mellitus. The VDRL was positive.

After control of the local cellulitis with antibiotics and bed rest a percutaneous left femoral arteriogram was obtained utilizing a single film technic. This film showed complete obstruction of a small superficial femoral artery at the adductor canal level with no runoff into the popliteal branches (Fig. 1). Amputation of the leg below-the-knee was indicated if exploration of the left popliteal artery confirmed the angiographic interpretation of an occluded popliteal artery.

On March 7, 1966 the left popliteal artery was approached through a short distal medial thigh incision. The distal femoral and proximal popliteal arteries could not be located in the usual positions beneath the sartorius muscle nor in the tendinous opening in the adductor magnus canal. After further dissection through the adductor magnus muscle to the more posterior and lateral thigh a large pulsating vessel was found deep to the long head of the biceps. This vessel was soft and free of plaques. Arteriogram of this vessel revealed it to terminate as tibial and peroneal vessels of normal caliber and configuration. The thigh incision was extended proximally and a small superficial femoral artery was found that terminated gradually in the lower thigh as the preoperative arteriogram had demonstrated. There was no evidence of direct continuation with the popliteal artery. The common femoral artery was temporarily occluded

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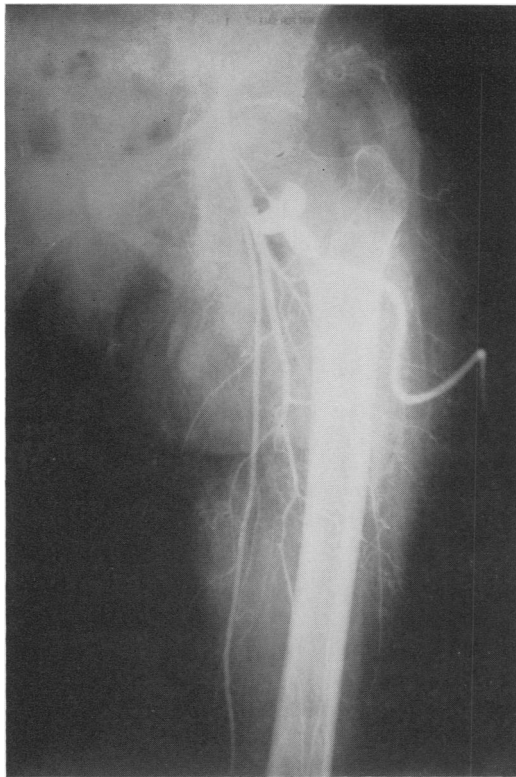


FIG. 1. Percutaneous femoral arteriogram revealing a small superficial femoral artery that terminated at the distal thigh level with no evident distal runoff.

and the vigorous pulsations continued in the abnormally placed popliteal artery. An anomalous blood supply to the left lower extremity was postulated and all incisions were closed.

One week following the arterial exploration a right retrograde femoral arteriogram was obtained utilizing a Seldinger Technique.¹⁰ * This study revealed a large and tortuous left hypogastric artery that passed distally through the greater sciatic notch with fusiform aneurysmal dilatation posterior to the femoral neck and continuation distally as the popliteal artery (Fig. 2A, B, C). The right lower extremity arteriogram appeared normal. Following this study a more detailed physical examination revealed a 5 by 6 pulsating mass in the left buttock deep to the gluteus maximus muscle. A soft systolic murmur was audible in this region. The left popliteal pulse was palpable but more laterally situated in the popliteal space than usual.

* This study was performed by Dr. Donald Taylor at Francis Delafield Hospital, New York City, and some of the arteriographic findings were previously reported (see reference).

A posterior tibial but no dorsalis pedis pulse could be palpated. With the patient lying supine and supporting her weight on the buttocks the amplitude of the popliteal pulse could be diminished. There was no history of trauma to the buttock region or of sciatica type pain. The patient herself was not aware of the mass in the left buttock.

The clinical impression was aneurysm of a primitive persistent sciatic artery and the gangrene was believed secondary to small emboli originating in the aneurysm. On April 1, 1966, the great toe with its metatarsal head and the distal phalanges of the second, fourth and fifth toes were amputated. The blood supply to these amputation stumps appeared adequate and they healed rapidly. Five days later, with the patient in the right lateral decubitus position and utilizing an operative field which included the abdomen, left buttock and upper thigh, an extraperitoneal approach exposed the left iliac vessels. The large anomalous hypogastric artery was traced distally toward its exit from the pelvis. A left posterior lateral thigh incision with detachment of the distal insertion of the gluteus maximus muscle exposed the sciatic artery distal to the aneurysm. The sciatic artery was then divided proximal and distal to the aneurysm excluding it from the main arterial stream. Through tunnels developed beneath the left inguinal ligament and through the adductor muscle mass an 8 mm. woven dacron prosthesis was placed with end-to-end anastomosis between the distal hypogastric artery and the sciatic artery (Fig. 3). The postoperative course was uncomplicated. Postoperatively, pulsations were no longer palpable in the buttock mass and there were excellent popliteal and posterior tibial pulses. The amplitude of these pulsations was not diminished by extremes of hip motion. A postoperative arteriogram revealed a patent prosthesis and good flow to the primitive sciatic artery (Fig. 4). No neurological deficit occurred.

Followup examination eleven months following operation revealed that the digit amputation sites were completely healed. Strong left popliteal and posterior tibial pulses were palpable. The skin circulation appeared excellent. The patient had no calf or thigh claudication.

Discussion

This patient was admitted to the peripheral vascular service of a large municipal hospital where many end stage vascular problems are seen. The diagnostic workup initially proceeded in a standardized manner. The initial failure to palpate a pop-

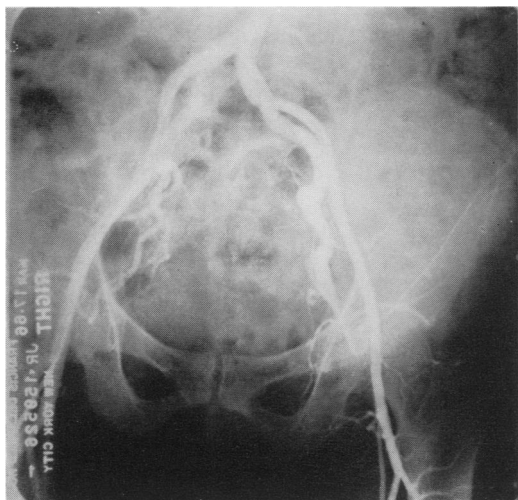


FIGURE 2A.

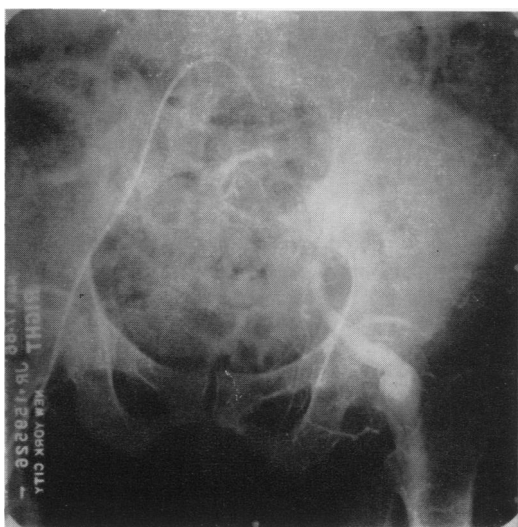


FIGURE 2B.



FIGS. 2A-C. Right retrograde femoral aortogram with the catheter tip at the left common iliac bifurcation. Figure 2A reveals the large left hypogastric artery passing posteriorly. Figure 2B reveals slower filling of a sciatic artery aneurysm posterior to the femoral neck. Figure 2C reveals the primitive sciatic artery coursing posterior to the femur. Note the delayed flow through the sciatic artery in contrast to the femoral system.

liteal pulse can be attributed to the more lateral and deeper course of the popliteal artery. The posterior tibial pulse and the diminished oscillometric readings may have been obscured by edema of the foot and the leg at the time of admission and conceivably by pressure on the aneurysm in the recumbent position at the time of the examination. The initial percutaneous femo-

ral arteriogram did not reveal the nature of the anomaly since there were minimal if any communications between the distal femoral and sciatic artery systems.

In most patients with minimal runoff and no major popliteal artery reconstitution, popliteal exploration prior to amputation rarely proves worth while. In this case exploration prior to amputation was believed

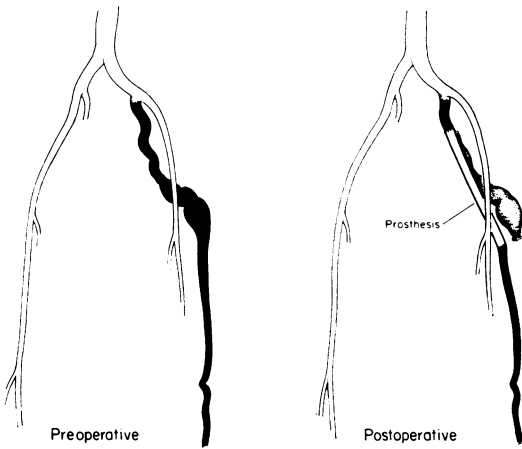


FIG. 3. Diagram illustrating the operative procedure performed.

advisable because of the peculiar appearance of the gangrene and the lack of collaterals on the arteriogram.

A gluteal aneurysm is a rare condition that was discussed frequently in the older surgical literature. To date 92 cases of gluteal aneurysms have been reported under that title. In the world literature reviewed by Hultborn and Kjellman there were 90 cases⁴ and two other cases were reported by Gimenez³ and Smyth.⁹ These reports emphasize a frequent traumatic etiology and that gluteal aneurysms arise more commonly in the superior than the inferior gluteal arteries.

In 1965 Joffe⁵ reported an aneurysm of a primitive persistent sciatic artery that was treated surgically. The primitive sciatic artery terminated 7 cm. distal to the aneurysm and the right superficial femoral artery pursued a normal course as far as the distal third of the thigh where it terminated by dividing into three smaller branches. It was assumed that the abrupt termination of the sciatic artery distal to the aneurysm was secondary to thrombosis. In Joffe's case, treatment consisted of endo-aneurysmorrhaphy. The postoperative course was complicated by foot drop.

Adachi¹ and Senior^{6, 7, 8} collected cases of persistent sciatic arteries from the world

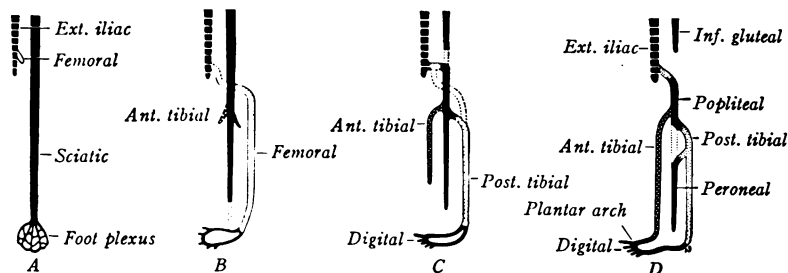
literature. Wright¹¹ in 1965 reported a case of persistent sciatic artery of the lower limb in association with hemi-hypertrophy. According to Arey,² a branch known as the axial or sciatic artery is given off from the umbilical or future hypogastric artery. In embryos of the 9 mm. stage the sciatic artery is the chief arterial supply to the lower extremity. Later the sciatic artery is superseded by the femoral artery which is a continuation of the external iliac artery. The femoral artery joins the sciatic artery and its branches distal to the middle third of the thigh. The sciatic artery persists proximally only as the inferior gluteal artery with its original distal course being marked by the popliteal and peroneal vessels. According to Senior all these changes are completed by the third month of fetal life. Based on cases in the literature found by Senior, in most instances in which there is a persistent primitive sciatic artery, the femoral artery is present wholly or in part.

The decision as to operation in our patient involved the necessity for restoration



FIG. 4. Postoperative right retrograde femoral arteriogram showing the more medial position of the arterial prosthesis as it courses beneath the inguinal ligament and through the adductor muscle mass.

FIG. 5. Stages in the development of the arteries of the human leg. (From Arey: *Developmental Anatomy*, 7th edition. Philadelphia, W. B. Saunders Co., 1965.)



of distal arterial flow into the primitive sciatic artery since there was no flow from the femoral system into the popliteal artery. It also appeared important to avoid dissection about the sciatic nerve since it was known that the sciatic nerve was in intimate relationship to the aneurysm and that the blood supply to the nerve was probably derived from a branch of the sciatic artery. The efficacy of a prosthetic graft being placed beneath the inguinal ligament and through the adductor muscle will become apparent only after long-term follow-up. Combined simultaneous extraperitoneal and buttock approaches to the hypogastric and sciatic arteries provided excellent operative exposure.

It is possible that some cases reported in the surgical literature as gluteal artery aneurysms may actually be aneurysms that develop in primitive persistent sciatic arteries in variable stages of persistence. Diagnostic studies on patients with pulsating buttock masses should consist of abdominal aortography with visualization of lower extremity runoff since the successful surgical management of the aneurysm may require simultaneous restoration of distal arterial flow.

Summary

The successful treatment of an aneurysm of a persistent primitive sciatic artery is reported. The difficulties with diagnosis, arteriographic findings and surgical therapy

are emphasized. The embryology of the blood supply to the lower extremity is reviewed briefly. This report is to our knowledge the second case of a sciatic artery aneurysm treated surgically and reported as a sciatic artery aneurysm. To our knowledge this is the only case reported in which surgical treatment of the aneurysm required restoration of blood flow to the distal arterial bed.

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